Epitomes

Important Advances in Clinical Medicine

General Surgery

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The Council on Scientific Affairs of the California Medical Association presents the following epitomes of progress in general surgery. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, as to both scientific fact and important clinical significance. The items are presented in simple epitome, and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, researchers, and scholars to stay abreast of these items of progress in general surgery that have recently achieved a substantial degree of authoritative acceptance, whether in their own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on General Surgery of the California Medical Association, and the summaries were prepared under the direction of Dr Wilson and the Panel.

Percutaneous or Surgical Shunts for Varices Caused by Portal Hypertension

THE CLINICAL INTRODUCTION of transjugular portosystemic shunt (TIPS) in 1989 led to its widespread use shortly thereafter with claims that it would make the surgical shunt and endoscopic therapy obsolete. Investigations were then undertaken to evaluate its efficacy. Most of the nonrandomized trials addressed stent patency, variceal rebleeding, and encephalopathy; the results showed that shunts established by creation of TIPS are far from permanent, with thrombosis or critical stenosis occurring in approximately 50% of patients within a year. Continuing shunt surveillance with reinterventions, however, can increase the longevity of the shunt to reduce the risk of variceal rebleeding. The rate of postprocedural encephalopathy is similar to that resulting from total portacaval shunts.

Five prospective, randomized trials comparing TIPS to endoscopic therapy (sclerotherapy or ligation) were recently reviewed. Although methodologic variability limits generalizations, TIPS is apparently more effective than endoscopic therapy in preventing variceal bleeding. This is not surprising, because TIPS corrects the underlying portal hypertension and endoscopic therapy does not. Encephalopathy rates are generally greater after TIPS (approximately 30% to 40%); survival rates are similar. The fifth, and most recently published, randomized trial confirms these findings.

The major limitation of TIPS lies in its potential to generate clotting, a result most likely caused by neointimal hyperplasia. The likelihood for these outcomes may be improved by evolving technological advances; for example, coating stents with material that discourages the development of thrombi.

Surgical shunts have likewise evolved since their introduction in the 1940s; they have proven their effectiveness in permanently preventing variceal hemorrhage. The venerable end-to-side and side-to-side portacaval shunts are examples of total shunts, which divert all portal flow from the liver. Randomized trials of such shunts against medical therapy demonstrated that their positive effect—preventing hemorrhage—was offset by increased incidences of encephalopathy and liver failure.

To circumvent this major disadvantage and to preserve portal flow to the liver, Warren's distal splencrenal shunt was introduced. This is a selective shunt that decreases the incidence of postoperative encephalopathy, especially in nonalcoholic cirrhotic patients.

The most recent advance in surgical shunts is the partial shunt. A small diameter portacaval H-graft is positioned between the portal vein and vena cava and combined with collateral ablation. The fixed resistance of the prosthetic graft provides a constant and safe alternate route for collateral flow. Ideally, portal hemodynamics are minimally altered to attain *collateral substitution.* Prograde portal flow is preserved, the occurrence of encephalopathy is decreased, and variceal hemorrhage is prevented. This operation is suitable for alcoholic cirrhotic patients, because its hemodynamic advantages are maintained over time.

In many ways, TIPS is closest in concept to the partial portacaval shunt. In each procedure, prosthetic conduits are interposed between the portal and systemic circulations. Both types of shunt permit transvenous catheter access to the portal system for interventional manipulations. TIPS can function as a partial shunt if the conduit's resistance is high enough to maintain portal perfusion of the liver. The advantage of the surgical partial shunt is its provision of long-term relief from variceal hemorrhage without the need for future revision. TIPS has the advantage of making a major intra-abdominal operation unnecessary, and in end-stage

cirrhosis, TIPS is probably a less intrusive bridge to liver transplantation.

In a randomized comparison of TIPS and the small-diameter portacaval H-graft (partial shunt), TIPS resulted in higher incidences of death, rebleeding, and liver failure.

More randomized trials of TIPS versus surgical shunts clearly are needed. Meanwhile, based on current data, the lengthy track record of surgical shunts, and the existing unrandomized trials of TIPS, it seems reasonable to limit the current use of TIPS to a subset of patients with variceal hemorrhage:

- unacceptable candidates for surgical intervention;
- survivors of failed endoscopic and surgical therapy;
- end-stage cirrhotics awaiting hepatic transplantation; or
- unstable patients in emergency situations.

Surgical shunts should be used in cirrhotics with good hepatic reserve who have had one episode of bleeding from varices, in whom endoscopic treatment has been deemed unsuitable or has failed. The evidence favors a shunt that preserves portal perfusion of the liver to minimize the chances of encephalopathy and liver dysfunction.

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Endovascular Aneurysm Repair

ABOUT 100,000 ABDOMINAL aortic aneurysms and 14,000 descending thoracic aneurysms were diagnosed in the United States in 1984. This number appears to be increasing as the age of our population increases. Aortic aneurysms usually enlarge over time, without accompanying symptoms. If left undetected and untreated, they may rupture, often causing death. Early detection through the screening of high risk patients and elective operative repair of these aneurysms are the keys to the optimal management of this common vascular problem.

Since 1991, the treatment of aortic aneurysms with endovascular stent-graft prostheses has been receiving attention as an alternative to major abdominal surgery. Aneurysm exclusion is performed with a composite stent-graft inserted intraluminally into the aneurysmal aorta from a remote site, usually through the femoral or iliac artery.

Most experience with the use of stent-grafts has been in the treatment of infrarenal abdominal aortic aneurysms. Only about one patient in eight has an abdominal aortic aneurysm configuration with lengths of proximal and distal aortic cuffs able to support a simple tube stent-graft prosthesis. To extend the range of candidates, bifurcated stent-graft prostheses have been developed. Modular stent-graft designs have also been configured to give additional flexibility in transluminal deployment. Transluminally placed endovascular grafts have also been used to treat thoracic aortic aneurysms, aortic dissections, traumatic arterial pseudoaneurysms, traumatic arteriovenous fistulae, and supra- and infrainguinal athero-occlusive disease.

A large number of composite stent-graft devices are in various stages of development; at least eight are in clinical trials. All of these devices share engineering design challenges. The endovascular stent-graft delivery system, either as a simple sheath or a carrying capsule, must be small enough to negotiate the remote artery through which it is inserted. It must also be flexible enough to traverse the often tortuous iliac arteries and lumen of the aneurysm, while avoiding dislodgment and embolization of the laminated thrombus and atheromatous grumous from the aneurysm sac. The graft attachment device must ensure the secure fixation and good apposition to the aortic wall necessary to prevent graft migration, graft detachment, the development of extraluminal channels, and the late development of perianastomotic pseudoaneurysms. This attachment device fixates the graft to the intra-aortic wall with either friction (by pressing against the arterial wall) or some type of hooking mechanism. Ideally, attachment devices should be able to conform to any future potential enlargement of the proximal or distal arteries to which it is juxtaposed. Finally, the graft prosthesis itself must be sufficiently strong to resist dilatation or mechanical breakdown and to allow good tissue incorporation. They have been made mostly from wire forms and Dacron polyester and occasionally from expanded polytetrafluoroethylene (ePTFE) materials, polytetrafluoroethylene (PTFE), or polycarbonate-based polyurethane.

The collaborative efforts of many investigators in this new technology have identified several problems that still must be addressed. Manipulating these devices within the diseased vascular system increases the risk of embolism. The intravascular positioning of these devices may occlude patent lumbar or mesenteric arteries, which may lead to paraplegia and/or visceral ischemia. Or, conversely, these arteries may not occlude, allowing the aneurysm to further enlarge and eventually rupture. Additionally, because most of these grafts are wedged in place, there are risks for perigraft leaking, graft migration, and even delayed aneurysm rupture with insufficient attachment or late dilation of the aorta at the points of fixation. Finally, to fit into these endovascular deployment systems, these graft prostheses must be thin-walled; they may be, however, prone to graft dilatation with loss of integrity over time. When